

APPLICATION FOR UNITED STATES LETTERS PATENT

FOR

**A Wireless Mobile Phone
Including A Headset**

Inventor(s):

**Peter Zatloukal
Robert M. Heddle
Christopher J. Dabrowski**

Prepared by:

COLUMBIA IP LAW GROUP, PC

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BACKGROUND OF THE INVENTION

5 1. **Field of the Invention**

The present invention relates to the field of wireless mobile phones, including headsets.

2. **Background Information**

10 Advances in computer and telecommunication technology have led to wide spread adoption of mobile client devices, in particular, wireless mobile phones. The term "wireless mobile phone" as used herein (in the specification and in the claims) refers to the class of telephone devices equipped to enable a user to make and receive calls wirelessly, notwithstanding the user's movement, as long as the user is
15 within the communication reach of a service or base station of a wireless telephone service network. The term "wireless mobile phone" is to include the analog subclass as well as the digital subclass (of all signaling protocols).

A conventional wireless mobile phone typically includes an input-output interface, such as an input-output port, for removable attachment of a headset to the
20 wireless mobile phone to facilitate receipt of telephony audio signals from the phone, and provision of telephony audio signals to the phone, for "hand-free" operation.

However, the next generation of wireless mobile phone is expected to be endowed with additional non-telephony functions, including functions such as radio
25 and/or audio player, having non-telephony audio outputs.

Thus, an improved, in particular, a more user friendly input-output interface arrangement that efficiently supports the richer audio input/output environment is desired.

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BRIEF DESCRIPTION OF DRAWINGS

The present invention will be described by way of exemplary embodiments, but not limitations, illustrated in the accompanying drawings in which like references
10 denote similar elements, and in which:

Figure 1 illustrates an external view of a wireless mobile phone of the present invention, incorporated with the improved input-output interface arrangement of the present invention, in accordance with one embodiment;

Figures 2a-2b illustrate various manners the improved input-output interface
15 arrangement of **Fig. 1** may be employed;

Figure 3 illustrates an internal component view of the wireless mobile phone of the present invention, in accordance with one embodiment;

Figure 4 illustrates the audio paths of the wireless mobile phone of **Fig. 1**, in accordance with one embodiment; and

Figure 5 is a schematic diagram illustrating the internal wiring of the novel
20 headset of the present invention, in accordance with one embodiment.

DETAILED DESCRIPTION OF THE INVENTION

The present invention includes a wireless mobile phone having an improved
5 input-output arrangement, and a complementary headset to facilitate delivery of
telephony and non-telephony audio to a user. In the following description, various
aspects of the present invention will be described. However, it will be apparent to
those skilled in the art that the present invention may be practiced with only some or
all aspects of the present invention. For purposes of explanation, specific numbers,
10 materials and configurations are set forth in order to provide a thorough
understanding of the present invention. However, it will also be apparent to one
skilled in the art that the present invention may be practiced without the specific
details. In other instances, well known features are omitted or simplified in order not
to obscure the present invention.

15 The phrase "in one embodiment" will be used repeatedly, however the phrase
does not necessarily refer to the same embodiment, although it may. The terms
"comprising", "including", "having", and other terms of the like, are used
interchangeably, and their meanings are synonymous.

20 **Figure 1** illustrates a wireless mobile phone **100** incorporated with the
teachings of the present invention, in accordance with one embodiment. As
illustrated, for the embodiment, wireless mobile phone **100** includes input keypad
102, "talk" and "end talk" buttons **104**, cursor control buttons **106**, display screen
108, antenna **110**, ear speaker **112** and microphone **114**, disposed relative to each
25 other as shown. Wireless mobile phone **100** also includes palm-sized body casing
116 with top end **118a** and bottom end **118b**.

Further, and more importantly, in accordance with present invention, wireless mobile phone **100** includes an input-output interface arrangement having at least input-output interface **122** and output interface **124**. In one embodiment, input-output interface **122** is an input-output port designed to accept a 2.5mm 4-pin plug, whereas output interface **124** is an output port designed to accept a 1.8 in 3-pin plug. In alternate embodiments, other input-output as well as other output interfaces may be used instead. For the embodiment, interfaces **122-124** are disposed at the bottom end **118b** of casing **116**. In alternate embodiments, interfaces **122-124** may be disposed at the top end, left/right side wall, or other locations of design preference. Moreover, for the embodiment, wireless mobile phone **100** is endowed with additional non-telephony functions (not shown), including in particular a radio function (not shown), and an audio player function (note shown) having non-telephony audio outputs, which are outputted through interface **124**.

As will be described in more details below, interfaces **122-124** are advantageously designed in a manner that allows each of interfaces **122-124** to be singularly employed to removably attach conventional telephony headsets and audio output only headsets to wireless mobile phone **100** respectively, as well as jointly employed to removably attach the complementary headset of the present invention, to be described more fully below referencing **Figures 2a-2b**.

For the embodiment, antenna **110**, disposed at and extruded from top end **118a**, in addition to being used to send and receive telephony signals, including audio as well as control signals (in a modulated or digitized manner), is also being used to receive radio signal with radio programming, to be described more fully below referencing **Fig. 3**. In alternate embodiments, a separate antenna may be employed to receive radio programming. In yet other alternate embodiments, antenna **110** may be disposed at and extruded from bottom end **118b**, as described

in co-pending U.S. Patent Application 09/767,526, filed Jan. 22, 2001, entitled "A WIRELESS MOBILE PHONE WITH INVERTED PLACEMENT OF ANTENNA AND INPUT KEYPAD".

For the embodiment, each of the other elements **102-108** and **112-114** performs its conventional function known in the art. For example, input keypad **102**, disposed near bottom end **118b**, facilitates a user in providing numeric or alphanumeric inputs, whereas "talk" and "end talk" buttons **104**, disposed in the mid-section of phone **100**, are used to start and end a call. Display screen **108**, disposed near top end **118a**, is used to echo numeric or alphanumeric inputs entered by a user, as well as to display various menu options, control information, and so forth. Cursor control buttons **106**, disposed in the mid-section of phone **100**, are used to facilitate a user in making various menu and/or option selections. Microphone **114**, also disposed near bottom end **118b**, is used to facilitate the user in providing audio input, whereas ear speaker **112**, disposed near top end **118a**, is used to facilitate outputting for the user, received audio. These elements and their operations will not be further described.

However, in alternate embodiments, input keypad **102** may also be equipped to enable a user to enter data and/or commands through stroking patterns, as described in co-pending U.S. Patent Application 09/767,197, filed Jan. 22, 2001, entitled "A WIRELESS MOBILE PHONE WITH KEY STROKING BASED INPUT FACILITIES".

Further, in alternate embodiments, wireless mobile phone **100** may also be endowed with other functionalities, such as encoded data entry facilities as described in co-pending U.S. Patent Application 09/975,287, filed October 10, 2001, entitled "WIRELESS MOBILE PHONE WITH ENCODED DATA ENTRY FACILITIES", or luminescent signaling display capability as described in co-pending

U.S. Patent Application 09/908,118, filed July 17, 2001, entitled "LUMINESCENT SIGNALING DISPLAYS UTILIZING A WIRELESS MOBILE COMMUNICATION DEVICE".

5 Referring now to **Figures 2a-2b**, wherein as alluded earlier, illustrate the various manners interface arrangement **122-124** may be singularly employed to removably attach conventional telephony headsets and audio output only headsets to wireless mobile phone **100** respectively, as well as jointly employed to removably attach the complementary headset of the present invention. As illustrated in **Figure**
10 **2a**, a conventional telephony headset **212** having earpiece receiver **216**, microphone **218** and plug **214** may be removably attached to wireless mobile phone **100**, via input-output interface **122**, and have telephony audio signals be transferred from wireless mobile phone **100** to earpiece receiver **216** or audio signals be transferred from microphone **218** to wireless mobile phone **100**, to allow wireless
15 mobile phone **100** to be used in a "hand free" manner. In one embodiment, plug **214** is a 2.5 mm 4-pin plug. In alternate embodiments, other connectors may be employed instead.

Further, a conventional audio output only headset **202** having earpiece receivers **206** and plug **204** may be removably attached to wireless mobile phone
20 **100**, via output interface **124**, and have non-telephony audio signals be transferred from wireless mobile phone **100** to earpiece receiver **206**. In one embodiment, plug **204** is a 1.8 in 3-pin plug. In alternate embodiments, other connectors may be employed instead.

However, as a result of at least the audio path arrangement of wireless
25 mobile phone **100**, complementary headset **222** of the present invention having earpiece receivers **226a-226b**, microphone **228** and novel connector **230** with two

plugs **224a-224a** may be removably attached to wireless mobile phone **100**, via input-output interface **122** and output interface **124**, and have telephony as well as non-telephony audio signals be transferred from wireless mobile phone **100** to earpiece receivers **226** or audio signals be transferred from microphone **228** to wireless mobile phone **100**, to allow wireless mobile phone **100** to be used in a "hand free" manner, as illustrated in **Fig. 2b**. The audio path of wireless mobile phone **100** as well as the wiring of connector **230** will be further described below referencing **Figures 4** and **5** respectively.

In one embodiment, telephony headset **222** also includes send/end switch (not shown). For the embodiment, the send/end switch is disposed on the same casing in which microphone **228** is disposed. In one embodiment, plug **224b** is a 2.5 mm 4-pin plug, while plug **224a** is a 1.8 in 3-pin plug. In alternate embodiments, other connectors may be employed instead.

Figure 3 illustrates an architectural view of a wireless mobile phone **100**, in accordance with one embodiment. As illustrated, wireless mobile phone **100** includes elements found in conventional mobile client devices, such as micro-controller/processor **302**, digital signal processor (DSP) **304**, non-volatile memory **306**, general purpose input/output (GPIO) interface **308**, and transmit/receive (TX/RX) **312** (also known as a transceiver), coupled to each other via bus **314**, and disposed on a circuit board **320**. Additionally, in accordance with the present invention, wireless mobile phone **100** further includes the earlier described dual "port" interface **122** and **124**, which as illustrated is coupled to GPIO **308**. Further, for the embodiment, wireless mobile phone **100** also includes radio receiver **310** coupled to antenna **110**, and a software implementation of an MP3 player (not shown).

At least radio receiver **310** and the MP3 player generate non-telephony audio signals for output through output interface **124**.

Except for the earlier described dual "port" interface **122-124** and audio path of wireless mobile phone **100**, to be described more fully below, each of these elements **302-314** performs its conventional function known in the art, and is intended to represent a broad range of such element and its equivalents. In particular, TX/RX **312** may support one or more of any of the known signaling protocols, including but are not limited to CDMA, TDMA, GSM, and so forth. Further TX/RX **312** may be implemented using separate transmitter and receiver.

Accordingly, elements **302-314** will not be further described.

Figure 4 illustrates the audio path of wireless mobile phone **100** of **Fig. 1** and **3**, in accordance with one embodiment. As illustrated, for the embodiment, telephony audio signals **404** (including ring tone), in addition to being coupled to output through input-output interface **122**, telephony audio signals **404** are also mixed with non-telephony audio signals **406** outputted by audio functions such as the earlier mentioned radio programming and media player (like MP3), and outputted through output interface **124**. Audio signals **402** from a telephony headset **212** or **222** are provided to wireless mobile phone **100** through input-output interface **122**.

Accordingly, when input-output interface **122** is singularly employed for a telephony headset, such as headset **212**, telephony audio signals are properly delivered to the headset. Similarly, when output interface **124** is singularly employed for an audio output only headset, such as headset **202**, telephony as well as non-telephony audio signals are properly delivered to the headset.

However, by virtue of the novel wiring of connector **230** of complementary headset **222** of the present invention, to be described in further detail below,

referencing **Fig. 5**, only one set of the telephony audio signals is properly delivered to the earpiece receivers **226** of headset **222**; the other set of telephony audio signals is advantageously removed.

5 **Figure 5** illustrates the wiring of connector **230** of **Fig. 2** in further details, in accordance with one embodiment. As illustrated, for the embodiment, pins 2 and 3 of 3-pin plug **224b** designed to engage output port **124**, are coupled to the right and left earpiece receivers **226** respectively, whereas pin 1 of 3-pin plug is coupled to both earpiece receivers **226**. Electret condenser microphone (ECM) **228** is coupled to
10 microphone (mic) circuitry **502**, which in turn is coupled to pins 1 and 3 of 4-pin plug **224a** in parallel. The connections between mic circuitry **502** and pins 1 and 3 are further subject to the condition of the send/end switch. More importantly, pins 2 and 4 of 4-pin plug **224a** are not coupled to earpiece receivers **226**. For the embodiment, no connections are provided for pins 2 and 4 of 4-pin plug **224a** at all.

15 Accordingly, telephony and/or non-telephony audio signals may be provided from wireless mobile phone **100** to earpiece receivers **226** through output port **124** and 3-pin plug **224b**, while audio signals may be provided from microphone **228** to wireless mobile phone **100** through 4-pin plug **224a** and input-output port **122**. However, telephony audio signals output from wireless mobile phone **100** are
20 advantageously non delivered to earpiece receivers **226**, thereby avoiding interference with the identical telephony audio signals or non-telephony audio signals delivered to earpiece receivers **226** through output port **124** and 3-pin plug **224b**.

25 Thus, a user having made a prior investment on a conventional audio only output headset, such as headset **202**, may continue to use the same conventional audio only output headset **202** to enjoy the non-telephone audio signals output

through output interface **124**, by removably attaching the conventional audio only output headset **202** to output interface **124**. A user having made a prior investment on a conventional telephony headset, such as headset **212**, may also continue to use the same conventional telephony headset **212** to operate wireless mobile phone **100** in a hand free manner, by removably attaching the conventional telephony headset **212** to input-output interface **122**. In each case, the user is protected with respect to his/her prior investment in headsets **202** and **212**.

However, a user elected to invest in the complementary headset **222** of the present invention, may use the complementary headset **222** to enjoy the non-telephony audio programming, properly receiving the non-telephony audio signals in earpiece receivers **226**, as well as to operate wireless mobile phone **100** in a "hand free" manner, properly receiving the telephony audio signals in earpiece receivers **226** and providing the telephony audio signals from microphone **228** to wireless mobile phone **100**, by removably attaching complementary headset **222** to wireless mobile phone **100** through input-output interface **122**.

In other words, wireless mobile phone **100** advantageously provides additional functions having non-telephony outputs, and a novel audio input/output interface arrangement **122-124** that provides new users with the opportunity to employ the new complementary headset **222**, and yet for users having made prior investments in headsets **202** and/or **212**, the flexibility of making additional investment in the new complementary headset **222**, or continuing to leverage on the prior invested headsets **202** and/or **212**.

Accordingly, a wireless mobile phone having an improved input-output interface arrangement, and a complementary headset has been described. While the present invention has been described in terms of the above illustrated embodiments,

in particular, in term of wireless mobile phones, those skilled in the art will recognize that the invention is not limited to the embodiments described. The present invention can be practiced with modification and alteration within the spirit and scope of the appended claims, or on other wireless communication devices. Thus, the description
5 is to be regarded as illustrative instead of restrictive on the present invention.

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